Women in natural resource collection: Experience from rural Jharkhand in India

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ABSTRACT: Women in poor families, particularly in rural and tribal areas are very close the natural environment and mostly dependent on it for their survival activities like grazing of cattle, collection of water and fuel-wood. These activities are considered to be inferior, less remunerative and suitable for the women or young kids. Thus, they are very close to the nature than men and this makes them perfect managers of an eco-system. However, there are significant inter-household differences in the gender-wise distribution of such activities, depending upon their socio-economic, cultural and religious characteristics, attitude towards women and children.

This paper examined to what extent women in rural Jharkhand are involved in such activities. Also, we tried to unearth impacts of various economic and cultural factors on the involvement women in such activities across various social and economic groups. The analysis of primary data collected from the rural areas of tribal dominated Jharkhand reveals that income, occupational status have significant adverse impacts on the involvement of women. Religious and cultural beliefs also determine the extent of involvement of women in such activities. It is also an indication of the low empowerment level of the rural women in the study area.

Women in Natural Resource Collection: An Experience from Rural Jharkhand in India[1]

INTRODUCTION

In rural society women are very closely linked with the natural environment. Poor families are mostly dependent on nature for their survival activities viz grazing of cattle (pastoral activities), collection of water for drinking and cooking purposes and collection of fuel-wood for cooking purposes (Bose, 2011; Basik, 2012). In the poor families due to the compulsion of earning, adult males mostly go for outside activities and sometimes female members of the family also join them. It is more common in the tribal dominated societies where women enjoy more freedom and power in their society. It is reflected from their significant participation in outside socio-economic activities, contribution to family earnings, participation in family decision making process and freedom of movement (Sen, De and Ghosh 2010). While, they are also found to have limited access to education, healthcare, subject to discrimination and exploitation in various fields. Moreover, the afore-mentioned natural resource collection activities are considered to be inferior, less remunerative and suitable for the women or young kids to perform.

Women are the primary users of forest since they are involved in collecting different forest products, bringing quality firewood, best fodder species, decomposition of quality forest litter, medicinal herbs, fruits and greens. So, their involvement is important, which is however not ensured through their collection (Agarwal & Ostrom, 2001). Much of the income is generated from the sale of forest products and collection works are undertaken by the women especially in the community forest, but the problem of women is not addressed by it and they are involved less significantly in the management of forest (Dutta 2007, Adhikari, 2011). In Nepal involvement of women in the management of forest through their representation in forest users' group committee are given much importance though their actual participation in decision making has been nominal (Buchy & Sublia, 2003). Not only the collection of non-wood forest products

[1]A modified version of the paper was presented at the 2nd ISM International Statistical Conference 2014 with Applications in Sciences & Engineering held at Pahang, Malaysia during 12-14 July, 2014.

and grazing of cattle, women of even the upper stratum of the rural society are engaged in fetching water from the community pond, tube-well or other common supply system for drinking and cooking purposes (Salzman, 2005). Less than half of the population in Africa lives within a 15-minute walk of a safe drinking water source (Thompson, 2000). Women spent on average 17.5 hours per week for gathering water in Senegal and 15.3 hours weekly in Mozambique. The daily average time spent for water gathering in 1997 across East Africa was 91.7 minutes daily, triple the time spent by them three decades earlier that indicates the rising stress on women as they mostly undertake this task. Lambi et al. (2012) described the need for the protection of natural resource and biodiversity for the livelihood of the neighbouring population. Involvement of local population is also prescribed for the purpose. Also, involvement of women not only in the collection, but also in the management is pertinent for long term sustainable use of such critical resources and to reduce the risk of depletion of resource base (Baland & Platteau 1996, Agarwal, 2010).

All these facts raised doubt about whether those women in tribal dominated rural societies are really empowered or they come out and join such activities out of their survival constraints. Whatever, be the reason, due to the very nature of their participation in various aforesaid activities, they are found to be more close to the nature than men and this very close relationship makes them perfect managers of an eco-system. The life of rural women is so much intertwined with the environment that whole ecosystem revolves around her and she can't even think of her survival without it. However, there would be significant inter-household differences in the distribution of such activities between male and female members of the families, depending upon their socio-economic characteristics, cultural and religious beliefs and attitude towards women and children. As mentioned above, involvement of women in such activities is found to more in the tribal dominated societies and depends on a number of factors, including their socio-economic status, nature of the resources, institutional arrangements and culture.

This paper tried to examine to what extent women in rural Jharkhand are involved in such natural resource collection and management activities. Also, we tried to unearth various economic and cultural reasons and their impact on the involvement women in such activities across various social and economic groups.

METHODOLOGY

For the purpose of analysis, a primary survey was conducted during 2007-08 for the collection of information at the family level from eight villages in four blocks of two districts of Jharkhand, chosen by systematic multistage sampling procedure. First of all, two districts of the state namely Giridih and Dumka have been selected, one from comparatively developed and another from underdeveloped section of the districts. In the same way two blocks, Bengabad and Giridih from the district Giridih and two blocks Dumka and Ramgarh from the district Dumka were selected, on the basis of records of District Census Handbook. Finally, four villages were chosen from each of the two districts i.e., two from each of the selected blocks. The villages chosen from Giridih district were Baghra, Bhandaridih, Harsinggraidih and Parsatanr and other four villages of Dumka were Karikadar, Kusmaha, Murabahal and Purnia. Thereafter, a complete enumeration of households of the selected villages has been done and we observe a total of 1298 households combining all the eight villages of the selected districts namely Giridih and Dumka.

First of all, the descriptive statistics is checked to understand the status of rural people in the survey areas. Then tabular as well as graphical presentation of proportion of women involved in the collection of drinking water, grazing of cattle, fuel-wood, source and distance of collection, occupation, earning and level of education of the head of households were described. In order to understand the status and position of women in those rural societies, a gender empowerment index was constructed in accordance with the guideline of UNDP after some modifications as applicable in those cases.

Thereafter, regression technique is followed to examine the impact of various factors on the participation of women and girls in these activities. As participation is a binary variable that takes value one if they participate and zero for not, a probit analysis is assumed to be an appropriate method. The rich, educated people of the upper stratum of the society were expected engage their women and girls in lesser proportion in these activities and thus the coefficients of these variables were hypothesized to be negative. Also, more the distance, due to their social and physical constraints women were supposed to go less for fetching water, grazing and collecting fuel-wood. Hence, distance is supposed to have negative impact. On the other hand, poorer have larger family size, less opportunities and cannot afford to hire labour for these inferior activities. So family size was supposed have positive relation with the engagement of women in these

activities. Though social custom also influences involvement of women in these activities, it was not included due to paucity of information.

RESULTS

A cursory look at the primary data collected from the rural areas of tribal dominated Jharkhand reveals that income, occupational and status of the families have significant inverse link with the involvement of women and also of girl child at the cost of their educational prospects. Religious and cultural beliefs also enter in the determination of extent of involvement of women and children in the rural society. It is also an indication of the low empowerment level of the rural women in the study area (Sen, De and Ghosh, 2010).

The socio-economic conditions of the sample families in the surveyed villages of rural Jharkhand are examined. Table-1a reveals that a large number of families are poor (about 98 per cent) and about 72 per cent of the respondent families own land of one acre or less than that. In aggregate 45.5 per cent of the respondents is either landless labourer or marginal farmer. Average land owned by all the surveyed families is 2.79 bigha i.e., less than one acre of land. Because of their poor family condition educational achievement is very poor and about 32 per cent of the head of the families could not achieve the primary level of education. Due to very low earning scope and lack of education in general, average family size is very big. Though average family size is over 6, it varies from 1 to as large as 35 and 52.7 per cent of the respondent families has size larger than 5 (Table-1b).

Table-1a: Percentage Distribution of Families with Socio-Economic Conditions

% of family having Per Capita Income below Rural Poverty line of INR 27 daily	% of Families Own Land < = 1acre	% of Families having Own Source of Water	Source of Drinking Water		% of the Head has Schooling below Primary (%)	Family Size		Landless Labourer or Farmer (%)
			Well/Pond	Tubewell/ Municipal		5 or Less	Above 5	
97.8	71.9	50.1	82.1	17.9	31.5	47.3	52.7	45.5

Table-1b: Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
Annual Per Capita Income (INR)	692.0	24000.0	4105.961	2206.3560
Own Land (Bigha)	1.0	24.0	2.791	1.4889
Maximum Year of Schooling of any Member in the Family	2.0	15.0	8.516	3.2141
Family Size	1.0	35.0	6.140	3.2760
Distance of Source of Drinking Water (Metre)	.0	1000.0	86.647	115.5297

Though a few of the families have their own source of drinking water, majority of them collect from the common well, pond and a few also from the tube-well and municipal supply.

More than 82 per cent of the families collect water from well or pond and they have to travel from zero to one kilometer for the purpose. The average travel for the collection of water is about 87 meter and large variation is observed across the families (Table-1b). Average per capita annual income is about 4106 INR and it ranges from 692 INR to 24000 INR. As substantial time and manpower is lost in the collection of water, it is normally done by the females and children. Also male members of the family, especially in the upper caste communities take part in fetching water. Maximum year of schooling attained by the highest performer of the sample families varies from 2 to 15 years.

The deprivation and level of gender empowerment across the surveyed villages is measured by constructing a village level index according to the formula used by UNDP[2]. We have thus considered some different indicators to make up the data gap as far as possible depending upon the availability and those are relevant for the analysis of rural Jharkhand. These are given below.

For understanding the level of gender empowerment by **GEM,** we have considered the following dimensions as well as indicators:

Dimension 1: Participation in social and political arenas and decision-making power of women

Indicators: a) percentage of Female/Male who are member of any club, community centre, social organization, NGO etc. b) percentage of Female/Male who are member of any political organization, c) percentage of Female/Male regularly attend/watch cultural programme, d) percentage of Female/Male who knows Panchayat member representing their area, e) percentage of Female/Male who are aware of the activities of the Panchayat (Weight- one fifth for each indicator within the dimension i.e., equal weight is given to all the indicators here).

Dimension 2: Economic participation and decision-making power

Indicators: a) percentage of Female/Male engaged in business/services, b) percentage of Female/Male who has read at least up to class five (Weight- half for each indicator within the dimension).

Dimension 3: Power over economic resources

Indicators: a) percentage of Female/Male who have received any kind of property by inheritance, b) percentage of Female/Male agricultural worker in their village. (Weight- half for

[2] Dimension index=(actual value-minimum value)/(maximum value-minimum value),
Equally Distributed index= $\{[\text{female population share (female index}^{-1})] + [\text{male population share (male index}^{-1})]\}^{-1}$ for each indicator.

each indicator within the dimension) In case of all the indicators we have taken the maximum value as 100 and minimum value as 0. But in case of the agricultural wage we have taken maximum value and minimum value for male as Rs. 106.96 and Rs. 47.64 respectively and for female as Rs. 62.31 and Rs. 37.78 respectively[3]. In all of the Equally Distributed Indices for all indicators we have taken female and male population share as 0.5 as in each of the household we have considered the response of the household heads as well as that of counterparts, but in case of agricultural wage index we have taken the population shares in terms of the participation of the household heads and counterparts in agriculture. Actually, the GEM measure in this case can be called as the **Village Level GEM Measure**. The computation and the variation in the level of gender empowerment measure are shown in table-2.

Table-2: Village Level Gender Empowerment Measure (GEM) for the Sample Areas of Jharkhand

Village	a1	b1	c1	d1	e1	a2	b2	a3	b3	DIM 1 Index	DIM 2 Index	DIM 3 Index	**GEM**
Baghra	0	**Nil**	0.9899	1	**Nil**	0	0.1244	**Nil**	0.3589	0.3980	0.0622	0.1794	0.2132
Bhandaridih	0.0384		1	0.9899		0	0.0320		0.4734	0.4057	0.0160	0.2367	0.2195
Harsingraidih	0		1	0.9899		0.0379	0.2519		0.5455	0.3980	0.1449	0.2728	0.2719
Parsatanr	0		0.9899	1		0.0369	0.1406		0.3844	0.3980	0.0888	0.1922	0.2263
Karikadar	0		1	0.9800		0.0367	0.3460		0.0411	0.3960	0.1914	0.0206	0.2026
Kusmaha	0		0.9796	0.8636		0	0.1697		0.0416	0.3686	0.0848	0.0208	0.1581
Murabahal	0		1	0.9899		0.0720	0.4392		0.0398	0.3980	0.2556	0.0199	0.2245
Purnia	0.0386		0.9899	0.9796		0	0.1737		0.0417	0.4016	0.0868	0.0208	0.1698

Note: Ki: indicator k of dimension i, k = (a, b, c, d, e), i = (1, 2, 3)

Source: Field Survey conducted during 2007-08.

Here, b1, e1 and a3 all are zeros because in all the villages all the members of any political organisation were male and none of their female counterparts had received any kind of property by inheritance. All ancestral property was being inherited by the male members only. Similarly, female in those areas did not involve themselves in active politics and panchayati raj system was not in place and neither they were aware of it.

A very low level of empowerments (GEM) was observed. The average GEM for the sample eight villages was 0.21073. The GEM index varied from about 0.16 in Kusmaha of Dumka to 0.27 in Harsingraidih of Giridih. It was a fact that Giridih was comparatively much developed and the village Harsingraidih was much nearer to the urban area while Dumka was a much backward district and the village Kusmaha was also an underdeveloped and remote village.

[3] All India annual average daily wage rates in different agricultural occupations, 2007-08. Downloaded from http://labourbureau.gov.in/WR%20Rural%India%202k7-8%Summary20Pages201-3.pdf (accessed on 13-05-2014)

Despite the poor values of the indicator across the selected villages of Jharkhand, a significant inter-village variation in gender empowerment and deprivation was observed.

Among various activities undertaken by the rural females, the three main outside activities related to the environmental assets like grazing of cattle, collection of fuelwood and fodder and the collection of water are considered here for the purpose of analysis. A comparative picture of involvement of females and males in the respective activities is presented below.

Collection of Drinking Water

Drinking water is a common problem of all the households in rural Jharkhand. Because of the scarcity of ground water availability and having personal water arrangement a very costly affairs the lower- and middle-class families cannot afford to have their own arrangements. Almost all of them have to depend on the collection of water from the common sources like lake, pond and scarce government supplies, wherever available.

Collection of drinking water is presumed to be under the sphere of women activities. Even in the upper middle-class families it is not considered to be a matter of prestige if women are engaged in fetching of water, unlike the case of cattle grazing or collection of fuel-wood, which are prevalent in the very backward and underprivileged communities. Table-3 shows that participation of female in the collection of drinking water is fairly large (about 92%). But the participation of male is merely 0.8%. In case of 7.2% of the families both male and female jointly undertake the responsibility of collecting drinking water. Majority of the households are found to bring water from the nearby common wells in the respective villages. There are also few households who go to public tube-wells for water collection. Scarcely, a few households have their own well within the circumference of their households. However, none of the households is found to go to river as it is far away from the sample villages. But it is common for the areas residing on the bank of the rivers, and mostly they use it for washing, bathing, gardening and similar such other activities. As collection of water is not considered to be derogatory and most of the surveyed families are poor, it is done only by the family members. Even, the children often join their mothers or elder sisters for the collection of water. The situation is almost identical for the tribal and non-tribal dominated or backward and relatively advanced villages as water is essential for survival and still now the village people in Jharkhand

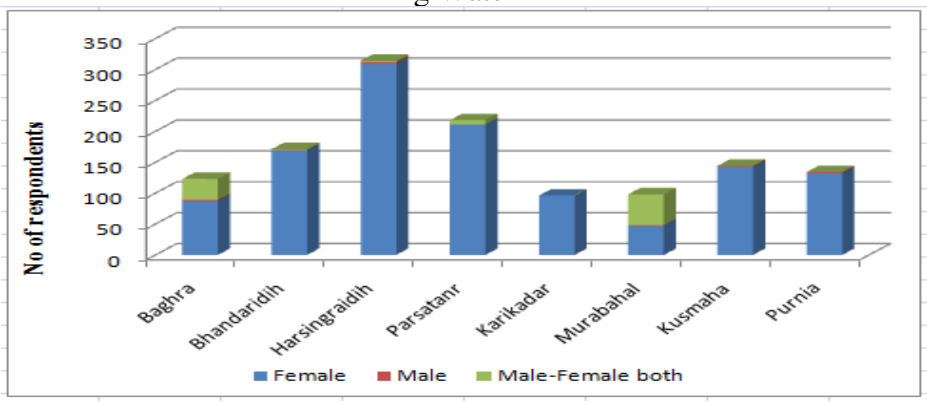
cannot afford to consume marketed bottled water and thus its market is almost non-existent there.

Table-3: Male and Female Participation in Collection of Drinking Water

District	Block	Village	Female	Male	Male-Female Jointly	Total
		Baghra	87 (70.73)	2 (1.63)	34 (27.64)	123
Giridih	Bengabad	Bhandaridih	169 (98.83)	1 (0.58)	1 (0.58)	171
		Harsingraidih	309 (98.41)	3 (0.96)	2 (0.64)	314
	Giridih	Parsatanr	211 (96.79)	0 (00)	7 (3.21)	218
		Karikadar	96 (100)	0 (00)	0 (00)	96
Dumka	Dumka	Murabahal	47 (47.96)	1 (1.02)	50 (51.02)	98
		Kusmaha	142 (98.61)	2 (1.39)	0 (00)	144
	Ramgarh	Purnia	132 (98.51)	2 (1.49)	0 (00)	134
Grand Total			1193 (91.9)	11 (0.8)	94 (7.2)	1298

Source: Primary survey conducted in 2007-08, **Note:** The figures in parenthesis indicate percentages.

Figure–1: Comparative Picture of Participation of Female and Male in the Collection of Drinking Water



Grazing of Cattle

About half of the population of the surveyed area depends on natural fields for their pastoral activities. The relatively rich people do not require grazing due to sufficient better job opportunities in the public or private sector or their own businesses and/or agricultural activities. Over 28% of the households engage their women, girl children and sometimes along with the hired labour (especially the child labour) for the grazing activities, which is considered to be the inferior occupation. The lower middle class having a sizeable cattle use hired labour (especially the children) for grazing activities and sometimes they do on their own. The uneducated children or the old households are utilized for this activity as they are not fit for the hard physical labour, which is required for agricultural and other unskilled activities. Only, in relatively better off

villages with less tribal proportion in the population proportion of female engaged in such activity is comparatively less.

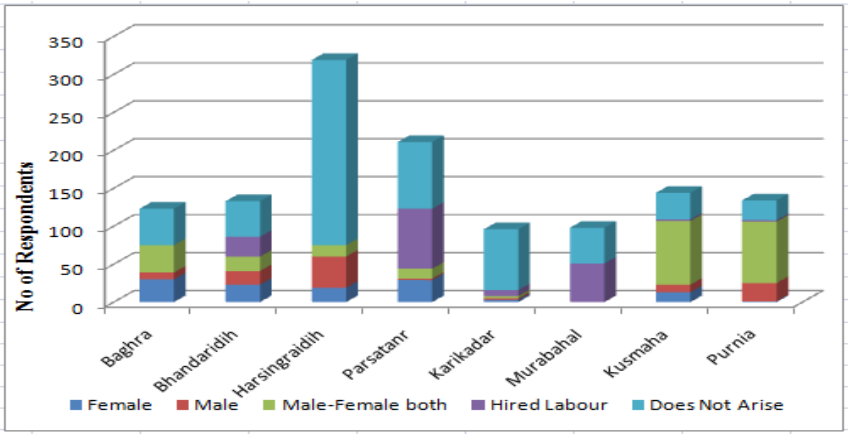
It is observed from the table-4 that overall, in the whole study area, female and male participation in cattle grazing is more or less same. Percentage of male and female in grazing of cattle are 8.1 and 9 respectively. Male-female both jointly undertake this activity in case of 19.3% of the families. Many households of the sampled villages of Jharkhand (12.9%) use hired labour to undergo cattle grazing. Among all the villages, Baghra and Harsingraidih are found not using any hired labour for the purpose of grazing. The primary survey also reveals that in most cases the household heads are not involved in grazing activity and majority of the households involve their children (due to the reasons mentioned earlier) in this particular work irrespective of their sexes. The parents act as helping hands and the children primarily share the burden of this activity.

Table-4: Comparative Picture of Participation of Male and Female Members of the Family in Cattle Grazing Activity

District	Block	Village	Female	Male	Male-Female jointly	Hired Labour	Does not Arise	Total
	Bengabad	Baghra	30 (24.39)	9 (7.32)	36 (29.27)	0 (00)	48 (39.02)	123
Giridih		Bhandaridih	23 (13.45)	18 (10.53)	19 (11.11)	26 (15.20)	87 (50.88)	171
	Giridih	Harsingraidih	19 (6.05)	41 (13.06)	15 (4.78)	0 (00)	244 (77.71)	314
		Parsatanr	29 (13.30)	2 (0.92)	13 (5.96)	79 (36.24)	88 (40.37)	218
	Dumka	Karikadar	3 (3.13)	2 (2.08)	3 (3.13)	8 (8.33)	80 (83.33)	96
Dumka		Murabahal	0 (00)	0 (00)	0 (00)	51 (52.04)	47 (47.96)	98
	Ramgarh	Kusmaha	13 (9.03)	10 (6.94)	84 (58.33)	2 (1.39)	35 (24.31)	144
		Purnia	1 (0.75)	24 (17.91)	81 (60.45)	2 (1.49)	26 (19.40)	134
Grand Total			118 (9.0)	106 (8.1)	251 (19.3)	168 (12.9)	655 (50.4)	1298

Source: Primary survey conducted in 2007-08, **Note:** The figures in parenthesis indicate percentages.

Figure–2: Comparative Picture of Participation of Female and Male in Cattle Grazing Activity



Collection of Fuel Wood

Rural people in underdeveloped countries like India depend heavily on the forest resources for fuel-wood and fodder (Lyngkhoi, 2007). Despite having plenty of coalmines in Jharkhand, rural people use fuel-wood at large for the purpose of cooking. Due to poverty coupled with high cost of coal and non-availability of LPG a large section of rural population are forced to use it. Over half of the rural population use fuel-wood and most of them collect it on their own. Only a few families collect fuel-wood from the market, where some very poor people sell fuel-wood after collecting from the forest for their livelihood.

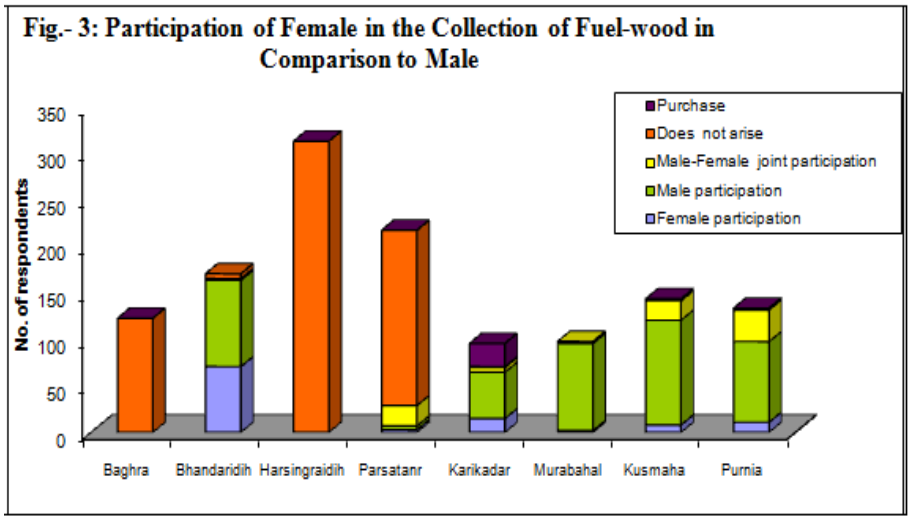
In the poor families, especially in tribal society females are also engaged in collecting fuel-wood. Many of them do it along with grazing and collection of fodder. Children also often join them in such activities. High opportunity cost of the males and their preoccupation in the hired labour force sometimes compel their female counterparts to undertake the responsibility of collecting fuel-wood and save resources from being spent on cooking fuel. Of course, the major responsibility of collecting fuel-wood is undertaken by the males, because of the distance covered for the collection and other household activities to be completed by the female members of the families. Table-5 reveals that in the sampled villages, in 8.4% of the samples families' female members are engaged in fuel-wood collection, while in 6.6% of the families both male and female members jointly take this responsibility. In case of 33.9% of the families, males are engaged in it.

There are many households (48.6%) particularly in Giridih district who do not depend on fuel wood collection as they make use of coal as cooking fuel. Coal is abundant in Jharkhand. In the villages of Baghra, Harsingaridih and Parsatanr in Giridih district adjacent to coalmine areas, hardly households use fuel wood but coal for its abundance. In case of Bhandaridih majority of the households depend on fuel wood to meet their cooking requirement. In the villages of Dumka district male participation in fuel wood collection is relatively more and most of the households use fuel wood as cooking fuel and only a few households (2.2%) purchase fuel from the market.

Table-5: Participation of Female in the Collection of Fuel-wood in Comparison to Male

District	**Block**	**Village**	**Female**	**Male**	**Male-Female Jointly**	**Does Not Arise**	**Purchase**	**Total**
		Baghra	0 (00)	0 (00)	0 (00)	123 (100)	0 (00)	123
Giridih	Bengabad	Bhandaridih	71 (41.52)	93 (54.39)	2 (1.17)	5 (2.92)	0 (00)	171
		Harsingraidih	0 (00)	0 (00)	0 (00)	314 (100)	0 (00)	314

	Giridih	Parsatanr	3 (1.38)	4 (1.83)	22 (10.09)	189 (86.70)	0 (00)	218
		Karikadar	15 (15.63)	50 (52.08)	5 (5.21)	1 (1.04)	25 (26.04)	96
Dumka	Dumka	Murabahal	2 (2.04)	94 (95.92)	2 (2.04)	0 (00)	0 (00)	98
		Kusmaha	8 (5.56)	113 (78.47)	21 (14.58)	0 (00)	2 (1.39)	144
	Ramgarh	Purnia	11 (8.21)	87 (64.93)	34 (25.37)	0 (00)	2 (1.49)	134
		Grand Total	110 (8.4)	441 (33.9)	86 (6.6)	632 (48.6)	29 (2.2)	1298
Source: Primary survey conducted in 2007-08, **Note:** The figures in parenthesis indicate percentages.								



Result of Regression

The probit analysis reveals that education, owning of land, occupation, income and family size has negative impacts on the participation of women or girl children for the collection of drinking water, which are in the expected line. But none of the coefficients are found to be significant. This is because water is an essential commodity and even though relatively better-off and non-tribal families have reservations on women participating in outside male dominated agricultural or business activities, they have no such reservation in case of women fetching water from outside. It is even normal for them who cannot afford to hire labourer regularly for such a job considered to be trivial as compared to other physical activities and women have less other involvement when men have to for earning bread. Moreover, nobody questions if the source of water is owned by the family. That is why, the coefficient of own source is highly significant. However distance a significantly negative impact on the participation of women for fetching water. Thus, the analysis shows the significant participation of women in the drinking water collection and management activities across the social and economic stratum and more prominently in case of their own arrangement. Only, in case of faraway sources, the male

members participate and collect the same either in the early morning or on their way back from their regular outside activities in the afternoon.

Table-6: Probit Analysis of Engagement of Women in the Collection of Drinking Water

Dependent Variable = Participation of Women, Pearson Goodness of Fit (Chi-Square = 125.722) (Significant at 1 per cent level)

Parameter	**Estimate**	**Std. Error**	**Z**	**Sig.**
Own_Land	-.027	.028	-.956	.339
Occu	-.018	.031	-.593	.553
Edu_Head	-.003	.012	-.224	.823
F_Size	-.012	.012	-.969	.332
Dist	-.001	.000356	-2.573	.010
PCI	-.00002	.00002	-.951	.341
Own_Source	2.572	.202	12.715	.000
Intercept	-2.410	.278	-8.672	.000

Table-7: Probit Analysis of Engagement of Women for Grazing of Cattle

Dependent Variable = Participation of Women, Pearson Goodness of Fit (Chi-Square = 717.887) (Significant at 1 per cent level)

Parameter	Estimate	Std. Error	Z	Sig.
PCI	-.0002	.00009	-1.897	.058
Own_Land	.135	.086	1.572	.116
Occu	-.084	.087	-.966	.334
Edu_Head	-.083	.034	-2.453	.014
F_Size	.042	.049	.866	.386
Dist	-.005	.001	-3.643	.000
Intercept	-.914	.741	-1.234	.217

Table-7 reveals the result of probit regression of whether women and daughters of the family participate in grazing of cattle on the relevant explanatory variables. It is found that per capita income, education of the household head and distance, have significant negative impacts on their participation. It indicates that the poor, uneducated households engage their girls and wives more in cattle grazing activities and it supplements their family income significantly. If they have to travel more, normally they send either their boys or adult males. The result is more or less same in case of engagement of women or girls for the collection of fuel-wood, as shown in Table-8. In both cases the coefficient of family size is positive, which indicates that in case of large families (that happens mostly to the poor and uneducated households) for the sustenance women and their girl children are forced to go for collection of fuel-wood, fodder and grazing, sometimes alone and sometimes along with others in the family. Only, some relatively rich people hire workers with low wage for these purposes.

Table-8: Probit Analysis of Engagement of Women in the Collection of Fuelwood and Fodder				
Dependent Variable = Participation of Women, Pearson Goodness of Fit (Chi-Square = 89.12) (Significant at 1 per cent level)				
Parameter	Estimate	Std. Error	Z	Sig.
PCI	-.00027	.000159	-1.686	.092
Own_Land	.496	.317	1.566	.117
Occu	.218	.162	1.344	.179
Edu_Head	-.102	.063	-1.612	.107
F_Size	.325	.095	3.423	.001
Dist	-.003	.002	-1.681	.093
Intercept	4.984	1.413	3.526	.000

Conclusion

The paper reveals that a large section of rural poor populations are dependent much on the natural resources for their survival. The extent of poverty force them to engage women and children significantly in natural resource collection including fuel-wood, fodder and grazing of cattle. Also, the most common important resource water is collected by women and girl children even in the relatively upper section of the families. The higher opportunity cost of male labourer put them in a position to go for earning for the family and the natural resource collection, which does not involve direct monetary earning in most cases and children who cannot be engaged in wage labourer, they are engaged mostly, which is more common if the sources are available in the nearby areas. Resources from the distant areas are collected in more proportion by the adult male members of the families and the relatively rich people in the upper stratum of the society sometimes use hired labourer for such activities.

Women in the water collection are used more intensely than grazing of cattle or collection of fuel-wood. Also in the large families due to incidence of poverty and larger involvement of male members for the survival activities, women are increasingly involved in these activities.

Thus, because of any natural disaster women and girl children suffer more intensely due to the depletion of natural resource like forest and water. It affects their productivity and they have to devote more time for such activities and survival. Not only in the collection, their empowerment and involvement in the management is essential. Due to the long term experience they can better manage such resources. Moreover, educational achievement of women is of

paramount importance to shift their activity pattern whereby economic improvement leads to better control and management.

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